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10/720,136	11/25/2003	Ikunao Isomura	245733US2SRD	4417
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OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314				
EXAMINER				
LIEW, ALEX KOK SOON				
ART UNIT		PAPER NUMBER		
2624				
NOTIFICATION DATE		DELIVERY MODE		
08/08/2008		ELECTRONIC		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/720,136

Applicant(s)

ISOMURA ET AL.

Examiner

ALEX LIEW

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Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 July 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-10 is/are allowed.
- 6) ☒ Claim(s) 11 and 16-22 is/are rejected.
- 7) ☒ Claim(s) 12-15 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/5508)
Paper No(s)/Mail Date 5/27/08
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

1. This office action is in response to the RCE filed on 7/15/08.
2. Response to Applicant's Arguments:
 - I. With regards to the arguments of claim 19, the applicant stated: "Thus, in the claimed invention recited in Claim 19, repeated pattern area are detected in design data, and die-to-die inspection is executed only on the measurement data in the detected area. Applicants consider that this is a significant difference patently distinguishing Claim 19 in operation mode from Specht."

The examiner will withdraw the USC 102(b) rejection. However, the combination of Alumot (US pat no 5,699,447) and Specht (US pat no 4,805,123) disclose all the limitations of claim 19; Alumot discloses a pattern inspection apparatus (figure 1) of comparing detected pattern data of one area with detected pattern data of another area among a plurality of repeated pattern areas (die-to-die comparison), and die-to-database inspection of comparing the detected pattern data with reference pattern data obtained from design data (column 2, lines 46-48, has discussions on die-to-die comparison and die-to-database comparison), comprising:

laser optics which form an optical electrical signals of a pattern formed on an inspection target plate on the basis of the design pattern data (figure 1, elements 4, are light detectors);

a detected pattern data generator which detects the optical electrical signal and generates the detected pattern data (column 5, lines 39-45);

a repeated pattern detector which analyzes layout information of the design pattern data as to whether patterns from the same file, in which repeated pattern data is

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included, exist and detects the plurality of repeated areas from the design pattern data (this limitation reads on 'die-to-database' column 2, lines 46-49 and column 27, lines 7-37, the reference die is read as the design data); and

a comparator which sequentially compares the detected pattern data corresponding to the plurality of repeated pattern areas detected by the repeated pattern area by the die-to-die inspection (column 2, lines 40-49, the second phase inspects the current pattern against a reference pattern, where the reference pattern is taken from a database or another die), when the plurality of repeated pattern areas are detector (figure 1, elements are the plurality of optic detectors).

Alumot does not explicitly disclose imaging optics to obtain two-dimensional images of each die pattern. Specht discloses imaging optics to obtain two-dimensional images of each die pattern (figure 1, 14 and 18 and 18 and 20, respectively are 1:N photo diodes). One skilled in the art would include imaging optics as imaging device because to the array of diodes will scan the wafer are a faster rate compared to a single pixel scanner.

II. Arguments presented for claim 1 are convincing. There are no motivations or additional prior arts which disclose the teachings of claim 1.

3. Allowable claims

Claims 1-10 are allowable.

With regards to claim 1, the examiner cannot find suggestion or motivation disclosing a comparator which sequentially compared the first detected pattern data corresponding to the plurality of repeated pattern areas detected by the repeated pattern area detector through the second imaging optics in accordance with die-to-die comparison, wherein after the second imaging optic forms the second optical image of the pattern, the low-resolution image data generator generates the second detected pattern data corresponding to the entire pattern region using the second optical image, the repeated pattern generator detects if the candidates exist, the first imaging optics forms the first optical image of the candidates, the detected pattern data generator generates the first detected pattern data of the candidates, and the comparator compares the first detected pattern data with die-to-die comparison in combination with the rest of the limitations of claim 1.

Claim Objections

Claims 12-15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

With regards to claim 12, the examiner cannot find any applicable prior art and / or suggestions disclosing *re-acquires* image data of the pattern with a second optical magnification higher than the first optical magnification within the detected area sizes, judges a coincidence degree of the candidates on the basis of the re-acquire image

data, and registers the candidates, when judged to coincide, as the plurality of repeated pattern areas in combination with all the limitations of claims 11.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 11, 16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alumot ('447) in view of Specht ('123) and Barker (US pat no 4,587,617).

With regards to claim 11, Alumot discloses a pattern inspection apparatus (figure 1) which performs die-to-die inspection of comparing detected pattern data of one area with detected pattern data of another area among a plurality of repeated pattern areas, and die-to-database inspection of comparing the detected pattern data with reference pattern data obtained from design pattern data (column 2, lines 46-49), comprising:

laser optics which form an optical electrical signals of a pattern formed on an inspection target plate on the basis of the design pattern data (figure 1, elements 4, are light detectors);

a detected pattern data generator which detects the optical electrical signal and generates the detected pattern data (column 5, lines 39-45);

a repeated pattern area detector which generates image data of an entire region of the pattern from the design pattern data with a pixel size corresponding to a first optical magnification lower than an optical magnification of the first imaging optics (column 2, lines 6-10), and detects whether candidates for the plurality of repeated pattern areas exist in the design pattern data by performing rough search of the second detected pattern data (column 2, lines 7-16 and 34-44); and

a comparator which sequentially compares a plurality of detected pattern areas on the second detected pattern data corresponding to the plurality of repeated pattern areas detected by the repeated area detector in accordance with die-to-die comparison (column 2, lines 40-49, the second phase examines the candidate defect areas against a reference pattern, where the reference pattern is taken from a database or another die).

Alumot does not explicitly disclose imaging optics to obtain two-dimensional images of each die pattern. Specht discloses imaging optics to obtain two-dimensional images of each die pattern (figure 1, 14 and 18 and 18 and 20, respectively are 1:N photo diodes). One skilled in the art would include imaging optics as imaging device because to the array of diodes will scan the wafer are a faster rate compared to a single pixel scanner. Alumot and Specht do not disclose measuring the size of the defect candidate areas. Barker discloses measuring the size of the defect candidate areas (figure 2, 24 and column 3, lines 34-36). One skilled in the art would include measuring the size of a defect because if defect is small enough to be ignore, then operator may skip the defect and move on to another to save time.

With regards to claim 16, an extension to the rejection of claim 11, Alumot discloses those repeated patterns having square shapes (see figure 9, the vertical length of each die is longer than the horizontal length). Whether detecting square, rectangular or any other improving the quality of the wafer. Floeder is combinable with Specht and Alumot because all references are based on inspection of product using image analysis.

With regards to claim 18, Alumot discloses the repeated pattern area detector detects a size or number of the repeated pattern areas input in advance before detection operation, and thereafter starts the detection operation (column 2, lines 7-16).

3. Claims 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Alumot ('447) in view of Specht ('123) and Barker ('617) as applied to claim 16, further in view of official notice (MPEP 2144.03).

With regards to claim 17, an extension to the rejection of claim 16, the size of the die does not change the image processing steps needed to inspect the dies, and semiconductor electronic of various sizes are well known (MPEP 2144.03). One skill in the art would choose a size of 1 mm square or less because to manufacture more chips with lesser which improve productivity and profit gain.

4. Claims 19, 20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alumot ('447) in view of Specht ('123).

With regards to claim 19, Alumot discloses a pattern inspection apparatus (figure 1) of comparing detected pattern data of one area with detected pattern data of another area among a plurality of repeated pattern areas (die-to-die comparison), and die-to-database inspection of comparing the detected pattern data with reference pattern data obtained from design data (column 2, lines 46-48, has discussions on die-to-die comparison and die-to-database comparison), comprising:

laser optics which form an optical electrical signals of a pattern formed on an inspection target plate on the basis of the design pattern data (figure 1, elements 4, are light detectors);

a detected pattern data generator which detects the optical electrical signal and generates the detected pattern data (column 5, lines 39-45);

a repeated pattern detector which analyzes layout information of the design pattern data as to whether patterns from the same file, in which repeated pattern data is included, exist and detects the plurality of repeated areas from the design pattern data (this limitation reads on 'die-to-database' column 2, lines 46-49 and column 27, lines 7-37, the reference die is read as the design data); and

a comparator which sequentially compares the detected pattern data corresponding to the plurality of repeated pattern areas detected by the repeated pattern area by the die-to-die inspection (column 2, lines 40-49, the second phase

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inspects the current pattern against a reference pattern, where the reference pattern is taken from a database or another die), when the plurality of repeated pattern areas are detector (figure 1, elements are the plurality of optic detectors).

Alumot does not explicitly disclose imaging optics to obtain two-dimensional images of each die pattern. Specht discloses imaging optics to obtain two-dimensional images of each die pattern (figure 1, 14 and 18 and 18 and 20, respectively are 1:N photo diodes). One skilled in the art would include imaging optics as imaging device because to the array of diodes will scan the wafer at a faster rate compared to a single pixel scanner.

With regards to claim 20, see the rationale for claim 16.

With regards to claim 22, see the rationale for claim 18.

5. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Alumot ('447) in view of Specht ('123) as applied to claim 19, further in view of official notice (MPEP 2144.03).

With regards to claim 21, see the rationale for claim 19.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALEX LIEW whose telephone number is (571)272-8623 or cell (917)763-1192. The examiner can be reached anytime.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella can be reached on (571) 272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Matthew C Bella/
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